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WEST VIRGINIA UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
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A Report On
Plant Diseases
Of the State.

BY JOHN L. SHELDON.

[The Bulletins and Reports of this Station will be mailed free to any citizen of West Virginia upon written application. Address, Director of Agricultural Experiment Station, Morgantown, W. Va.]

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A Report on Plant Diseases of the State.

By John L. Sheldon.

FIELD OBSERVATIONS.

On account of the regular instruction given throughout the college year, with the exception of a part of the winter quarter and after the close of the Summer School, it has been impossible to make many systematic observations on the prevalence of plant diseases in the various parts of the State. Most of those that have been made were near Morgantown. During the months of August and September, three trips were made to the western part of the State in order to obtain some data at first-hand on the diseases of melons and the blighting of fruit trees in the northern pan-handle. Another trip was made to portions of Monroe and Greenbrier counties for observations of a similar nature. The result of these observations will be found under their proper headings.

DISEASES OF CULTIVATED PLANTS.

The constantly increasing demand for grains, vegetables and fruits of all kinds has brought about a corresponding increase in the acreage to supply this demand. There are still fields of grain, garden patches, scattered fruit trees, and small orchards, but it is no uncommon sight to see in a single, or in adjacent fields, hundreds of acres devoted to the growing of one kind of grain, and immense orchards containing thousands of trees. On the farm where different kinds of crops are grown, as well as cattle, sheep, and hogs, the failure of any one crop on account of its being "an off year" or from disease or insects, does not matter so much as it does where success or failure depends upon a single crop. It is the specialist first, the grower of but one crop like fruit, and the farmer second, who needs to know how to prevent the occurrence of an "off year," disease and insects, in order to raise a profitable crop. Before a means for the prevention or control of plant diseases can be safely employed, it is necessary to determine their causes, otherwise the remedy might be worse than the disease. At best, very little is known along these lines, but rapid progress has been made within the last few years, and in all probability must continue to be made, if profitable crops are to be grown.

Failure to secure a good crop may be attributed to a number of causes, among which are the weather, soil and cultivation, insects and fungi. Insects and fungi do an immense amount of damage to crops every year. The massing of plants, as in grain fields and orchards, makes the best possible conditions for the development and spread of insects and parasitic fungi, when once introduced. The insect problems belong principally to the entomologist, while the diseases of plants caused by parasitic fungi belong to the plant pathologist.

In order to get some immediate data of the more important diseases of cultivated plants for the year 1903, between 600 and 700 letters were mailed during the latter part of September of that year to the principal farmers and fruit growers of the State, in so far as it was possible to obtain their names and addresses. Answers were received to about one-fifth of these letters, showing that a good number of those to whom the letters were sent were interested in this new work of the Experiment Station. It is probable that the majority of those who received letters did not have diseases attacking their crops to such an extent that they considered them of any special importance. While the answers to the letters in a few instances were misleading, it was evident that there had been something the matter with the crop. On the whole, they were exceedingly valuable, and furnished information at short notice that could not have been very well obtained in any other way. It was possible in most cases to tell what the real disease was, especially when several reports were received from the same locality. In most cases, those who sent in replies had done little, if anything, toward trying to prevent or control the diseases reported. Those who had sprayed, and who had done it thoroughly and systematically, reported favorable results.

In order to ascertain the distribution of the different diseases over the State and to furnish a ready means for referring to the distribution of the diseases from year to year, more quickly than can be done by referring to the data as it is collected, the different diseases have been mapped by counties. Of course, these maps do not show the total distribution of the diseases, but they do show them in so far as it was possible to obtain data. The Black-knot of the plum was reported from only twenty counties in 1903, yet it is probable that the disease is in every county of the State.

The following are some of the more important fungous diseases that have been observed since September 1903 and during 1904, and that have come to my notice through correspondence. It is scarcely possible to give more than a general description of the diseases and a means for their prevention or control in a report of this kind, but correspondence on any one or all of them, or others, is requested and will be cheerfully answered. The Experiment Station is desirous and anxious to obtain specimens and information concerning any and all diseases of cultivated crops, ornamental plants and forest trees found in West Virginia.

APPLES.

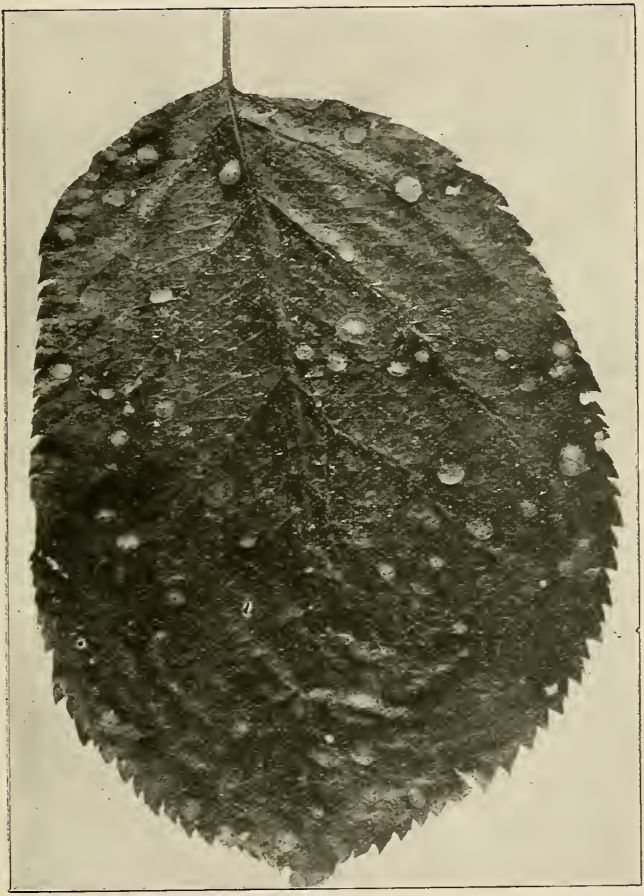
Bitter Rot. This is one of the most destructive diseases of the fruit, beginning about the time the apples show signs of ripening. Small masses of pinkish spores are found oozing out through the brown decayed spots in the skin. The inside of the apples become intensely bitter where the rotting takes place. Bitter rot not only occurs on the fruit, but produces "cankers," or dead spots, on the branches. It is in these "cankers" that the disease is carried over from one year to the next. Spraying the trees with Bordeaux mixture, and removing the branches infested with the "cankers" is recommended.

Black Rot. This is another destructive disease, causing the fruit to rot and "cankers" on the branches. The young growth is some times killed, the twigs then resembling those attacked by the twig blight, for which it may be mistaken. The disease was found on apple leaves at Wellsburg. The black rot is similar to the bitter rot in general appearance, except that instead of the masses of pinkish spores that break through the skin in the case of bitter rot, there are small black bodies imbedded under the skin in the case of black rot. The shrunken and shriveled apples ("mummies") often remain on the trees for a year or more. This disease has been very destructive to quinces in several parts of the State. At a number of places where it was found on quinces, it was also found on apples near by. The same treatment is recommended as for bitter rot. It is possible that the black rot might be controlled to some extent when it is found on quinces by picking the rotting fruit before the spores have developed and become distributed. On apples this might not be feasible on account of the size of the trees.

Canker. The "cankers" are the dead and shrunken areas occasionally found on the branches and trunk. They are due to a number of causes. (See under Bitter Rot and Black Rot.) One of the common ones found in old orchards is known as the "Illinois Canker." It may be recognized by the black round bodies that push through the dead bark on the branches and trunk. These bodies are sometimes nearly one-fourth of an inch in diameter, and attached to the wood, so that when they are broken off, a black ring remains. Keeping the "cankers" and dead branches cut out should prove effective.

Crown Gall. This has been reported as occurring on nursery stock shipped into the State. Several specimens of the disease have been received at the Experiment Station. It would be well to burn all infected stock, such as apple, pear, peach, cherry, raspberry and blackberry, that have hard, irregular, rough swellings on the crowns or roots, in order to prevent the introduction of the disease. The swellings or galls are sometimes covered with a large number of roots. A similar disease is produced by an insect called the woolly aphis.

Leaf Spots. In some orchards, the branches have been



LEAF SPOT OF APPLE. NATURAL SIZE. FROM PHOTOGRAPH BY W. E. RUMSEY.

stripped of their foliage by July or August. An examination of the leaves showed that they were covered with large grayish spots, with a brown border in some instances. The disease is popularly known as "frog eye," but I find that the "frog eye" fungus is not always present. It is evident that there is considerable confusion as to what "frog eye" is. Several species of fungi have been found associated with the "frog eye" in the same spot, so that it is not certain which fungus was the cause of the trouble. The prevalence of this disease in 1904 warrants further investigation. It is possible that one of the standard sprays might be of some value in controlling the disease.

Rust. This is a common disease in those parts of the State where red cedar or juniper grows, or is planted as an ornamental tree. One stage of the rust occurs as bright yellow spots on the leaves of the apple about August or later; the other stage occurs as hard brown bodies, sometimes an inch in diameter, on the red cedar, and are called "cedar apples." Occasionally the rust is found on the twigs and fruit of the apple. The disease is carried in some way from the cedar to the apple and from the apple back to the cedar. Some varieties of apples are more susceptible to the disease than others. If the disease makes its appearance in an orchard sufficient to become injurious, the best means of getting rid of it is to cut all the red cedars near the orchard.

Scab. The "scabs" that are so often seen on apples are too well known to require a description. The fungus causing them also attacks the leaves, giving them a sooty appearance; it causes the little apples to fall off, and the older ones to become irregular in shape and scabby. Treat the same as for leaf spot.

Sooty Blotch and Fly Speck. These are two very common diseases on apples that grow in moist and shaded places. They do no special injury to the fruit, excepting that it does not look as well and therefore does not sell as well. In setting out an orchard a location should be selected where the trees will receive plenty of air and sunshine. Spraying the trees with Bordeaux mixture will check the fungi.

Twig Blight. During the month of June, there was an average of one letter a day received at the Experiment Station, describing the effect of the bacteria that cause this disease, and making inquiries similar to the following:

"The apple trees in this vicinity are from some unknown cause dying. The first year the young growths die as if by fire; the second year the whole tree is dead. Last year I noticed one tree in my orchard in this condition; this year that tree is dead and all the remaining trees are going the same way."

"I enclose you samples of blight appearing in my apple orchard and affecting some of my finest trees. Can you give me a remedy? I should like to hear from you at once."

"There is a blight that is killing the pear trees in this and adjoining counties. * * * It has injured the crab apple trees and some of the other trees in the orchard. * * * Is there anything that will save the trees?"

Twig blight also occurs on the quince. It is one of the worst diseases that has been on the apple this year. In some orchards that I visited there were so many twigs affected that it would be almost impossible to cut them out, the disease having become epidemic. There is a possibility that it may not be so bad another year. About the only known remedy is to keep the twigs cut out.

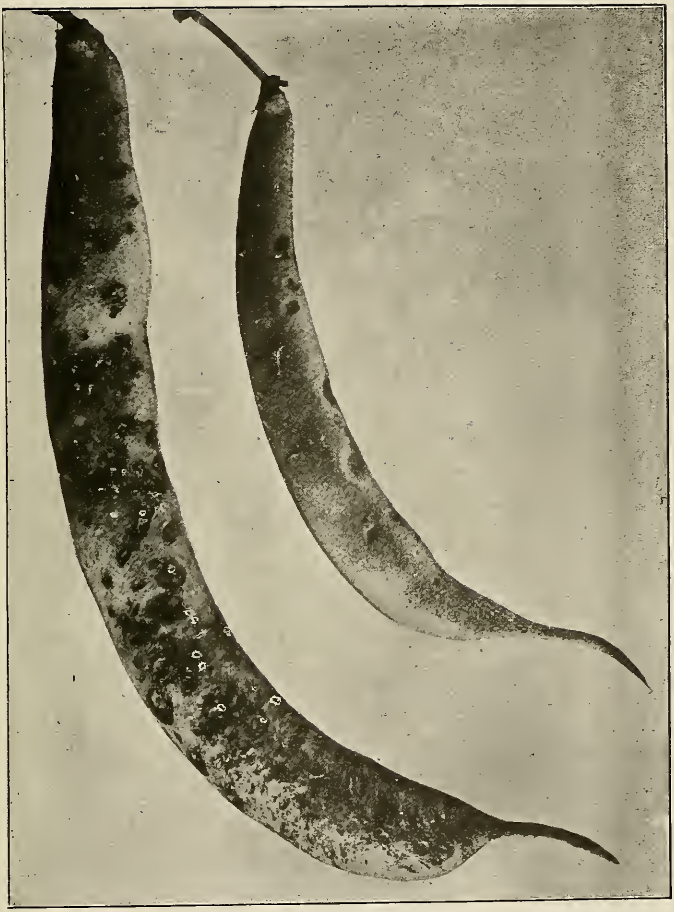
My attention has been called to a disease which attacks the trunks at the surface of the ground, causing the bark to die and peel off. The disease has received the name of "root rot." This will require further investigation. There is also a blighting of the foliage in the northern pan-handle that is attributed to the gases escaping from certain industries in that region. This will also need further investigation.

ASPARAGUS.

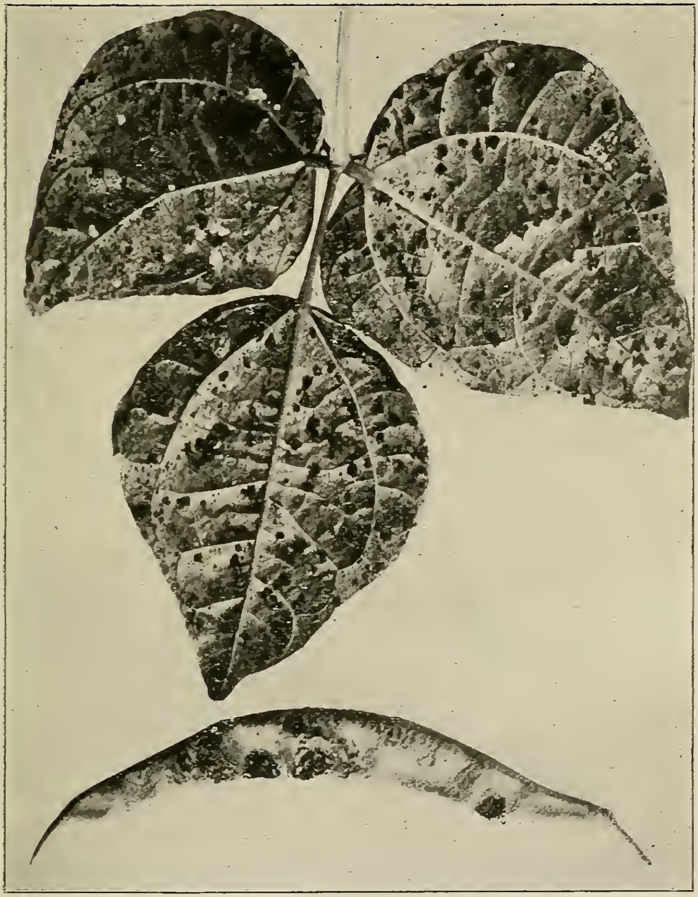
Rust. This disease has been seen in only two beds. No data has been received through correspondence. The rust, which is similar in appearance to the wheat rust, causes the brush to die during the summer, thus weakening the plants the next year. The brush should be burned at the end of the growing season, in order to destroy the spores of the rust.

BEAN.

Anthracnose. This disease has been common in almost every



Bean Anthracnose. Natural size. From photograph by W. E. Rumsey.



Bean Rust. Natural size. From photograph by W. E. Rumsey.

garden. One correspondent writes that half of his crop was destroyed. The fungus producing the disease attacks all parts of the bean plant, but is more noticeable on the pods where it produces sunken, scab-like spots, making them almost worthless for string beans. The disease may be carried over from year to year on the beans. Collect and burn all the refuse in the autumn. A rotation of crops is desirable.

Leaf Blotch. This was abundant on some beans at the Experiment Station. The leaves were covered with irregular brown spots and turned yellow.

Rust. The rust has been about as plentiful as the anthracnose, but caused less damage to the crop. Brown, powdery masses are produced on the leaves and occasionally on the pods. The refuse should be burned in the autumn. The rust was not found on lima beans growing beside the common varieties of bush and pole beans.

BEET.

Leaf Spot. The leaves are covered with purplish spots having a gray center. This disease is often very destructive to sugar beets.

BLACKBERRY.

Rust. The orange rust has been abundant on the wild and cultivated blackberries, and in some places on the raspberry. The fungus which produces the orange colored masses of spores on the underside of the leaves lives in the plants from year to year, so that the best remedy is to dig up all infested plants as soon as the rust makes its appearance and burn them.

CABBAGE.

Brown Rot. This has caused some trouble in a few gardens. Cabbage should not be grown on this ground next year. The decayed spots on the leaves inside the heads are caused by bacteria.

Club Root. This disease has been noticed a few times. It may occur on turnip, cauliflower and various other plants of the mustard family. The organisms which produce the thickened and twisted roots have been known to live in the soil for a number of years, so that a field where the disease has once occurred should not be planted to any of the above crops for some time.

CELERY.

Leaf Blight This disease was found on some celery at the Experiment Station. The leaves were covered with brown spots at first, after which they turned yellow and dried up. The plants were sprayed with Bordeaux mixture, but at the time this report was prepared, I could not tell how successful the spraying had been in checking the development of the blight.

CHERRY.

Black Knot. This has caused considerable damage to the sour cherry in certain localities. See under Plum.

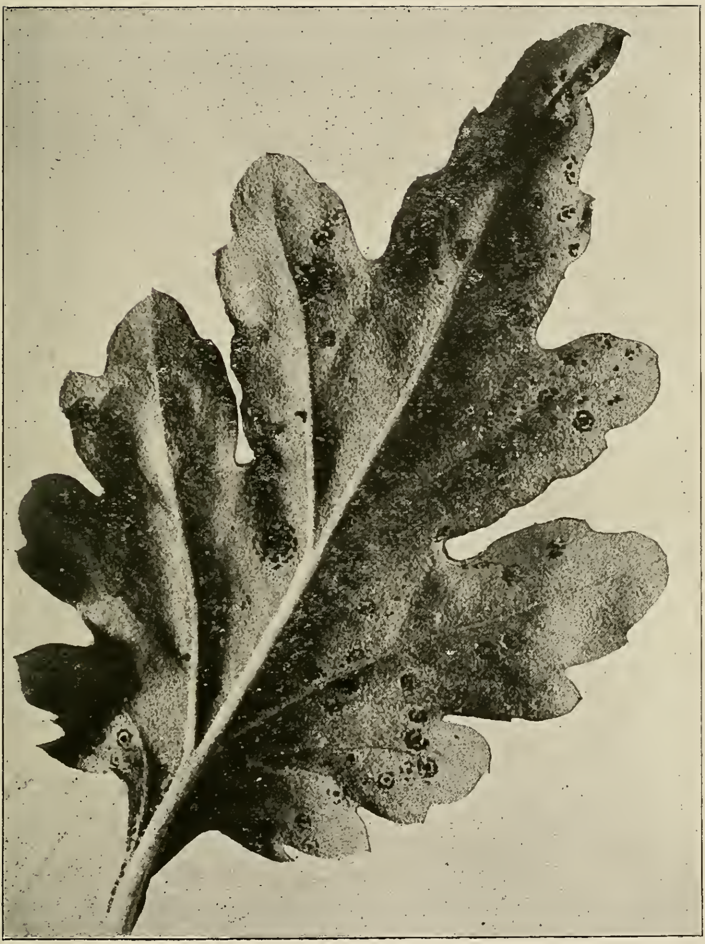
Brown Rot. See under Plum.

Leaf Spot. Small purple spots appear on the leaves, especially of the sour cherry. The leaves turn yellow and fall off. This is a common disease in those portions of the State that I have visited. Some of the trees were stripped of their foliage at the top while others were only on the lower branches. Spraying with Bordeaux mixture early in the season, and again after the fruit has been picked, is recommended when the disease is severe.

Powdery Mildew. The leaves are covered on one or both sides with a white cobwebby growth, which causes them to become crumpled. The disease occurs so late in the season that it seldom injures bearing trees.

CHRYSANTHEMUM.

Rust. There was an abundance of the rust on the chrysanthemums in the Experiment Station greenhouse in 1903 and some in 1904. The disease was probably introduced into the greenhouse on a few plants which had the disease when they were transferred from the field in the autumn, or on a few obtained by purchase. The leaves were spotted with powdery brown masses of spores. The spores are scattered from plant to plant in various ways, bringing about infection if they come in contact with water.



Chrysanthemum Rust. Natural size. From photograph by W. E. Rumsey.

CLOVER.

Dodder. The yellow, thread-like parasite with white blossoms, called dodder, has been sent to the Experiment Station from the western part of the State. The dodder is usually introduced into a field in the clover seed. In buying seed, one should accept none from a dealer without his guarantee that it is free from dodder seed. Such seed is offered in the market at a slight advance in price over the seed that is not guaranteed. The infested clover should be cut and burned before the dodder has matured its seed.

What seems to be a new disease has made its appearance on the red clover at the Experiment Station farm. The fungus causing the disease produces black spots on the stems and petioles of the leaves, after which the portion above the spot dies making the field as brown as if the crop had gone to seed. It is possible that the disease is the same as was reported from Michigan several years ago. It resembles an anthracnose of some sort. It will be investigated the coming season. Specimens answering to the above description, or information concerning the appearance of the disease elsewhere, will be very acceptable.

Failure to Maintain a Stand. There has been considerable difficulty of late years to get a permanent stand of clover in the Ohio and Kanawha valleys. From a rather limited investigation, it has been determined that when clover was sown with a nurse crop, that it died out after the nurse crop was cut, sometimes within a few days. In fields where clover has been sown with wheat, there was a rank growth where there had been stacks of wheat or corn the year before, the refuse seeming to act as a mulch and preventing the soil from drying out. There was also a good stand around the sides of a field where the grain had been cut for some unknown cause, before it was mature, and in fields where there was no nurse crop, excepting what weeds came up, there was also a good stand. It may not be safe to conclude that the use of a nurse crop that is allowed to ripen its grain is the principal cause of the difficulty, but the indications point that way. The constant cropping of the land without any considerable return of fertilizers, other than the commercial fertilizers, should be taken into account. It is known that a crop of grain takes an immense amount of water out of the soil at the period of ripening. This being the case, the young clover, which has had to struggle against a rapidly growing crop in order to get water, is now left in a soil that is dry, and, in addition, is exposed to the hot rays of the sun from which it has been practically shaded, and whose heat will tend to dry out what little moisture there is remaining in the soil. Under these conditions, is it to be wondered at that the young clover plants dry up and disappear in a few days? With a carefully prepared seed bed, one ought to get a good stand of clover. There are people who are doing it in that part of the State. I found nothing to indicate that clover was dying from the effects of a fungous disease. An investigation of the methods of cultivation belong to the agriculturist rather than to the plant pathologist. The opinions of those who have not been able to get a permanent stand of clover, as well as those who have, and a discussion of the causes to which they attribute their success or failure, will be very acceptably received at the Experiment Station.

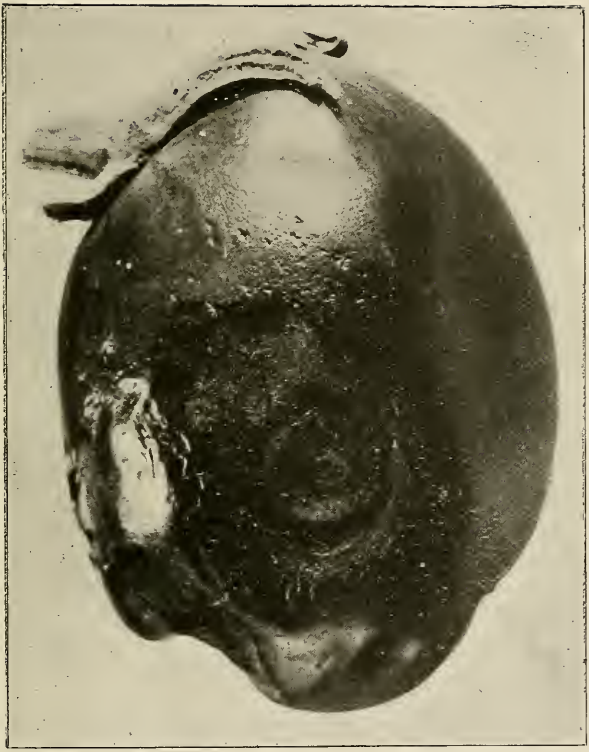
CORN.

Rust. A rather common disease of the leaves, which are spotted with powdery masses of brownish spores. It is seldom injurious.

Smut. Everybody is familiar with the swollen black masses produced by the corn smut fungus. In some fields there has been considerable, but it was mostly confined to the stalks.

CUCUMBER.

Anthracnose. This disease has been found on a few plants, usually where the cucumber vines were near watermelon vines attacked by anthracnose. It appears as yellowish brown spots on the leaves. Sometimes it attacks the young cucumbers, causing them to rot, but none have been seen nor reported to the Experiment Station. The appearance of the anthracnose and other diseases on the cucumber will be watched for with considerable interest, as they may prove to be a rather serious trouble in



Anthracnose of Egg-plant. Natural size. From photograph by W. E. Rumsey.

connection with the pickle industry that has been established in the vicinity of Point Pleasant. (See special report on the diseases of melons and cucumbers.)

COW-PEA.

Leaf Spot. In one field of cow-peas, a leaf spot disease was found which was stripping the plants of their foliage. In another field it was apparently doing very little injury. The leaves were covered with reddish brown spots.

EGG-PLANT.

Anthracnose. An anthracnose has been found on the fruits of some of the egg-plants growing at the Experiment Station. The pits, which varied in size from a small speck to nearly two inches in diameter, had small masses of spores oozing through the skin. Anthracnoses were found on beans and peppers growing near the egg-plants. From the experiments conducted by Dr. Halstead, of the New Jersey Experiment Station, it may be that the anthracnoses of the egg-plant, pepper and bean are identical.

Dying of Leaves. The leaves on the plants at several places were found to be brown and dying, especially at the tips. The dead spots were not confined exclusively to the older and lower leaves, but were on the upper and younger leaves as well. There was no fungus present in the dead areas, that is, any that would have caused the dying. Insects had been at work in the roots of some of the plants, and many had a poorly developed root system. Whether the lack of development of the roots was due to soil conditions, or whether the roots were injured in transplanting, could not be determined. Some of them looked as if the roots had been permanently injured by crowding in the seed-bed.

Leaf Spot. The leaf spot disease has been found wherever there were egg-plants. The fungus which causes the disease produces brown spots on the leaves, with very small black specks in the spots, the fruits of the fungus. Where the leaf spots occur, it is not advisable to grow egg-plants on the same ground the following year. If the disease is at all destructive, Bordeaux mixture can be used to advantage.

GRAPE.

Anthracnose or Bird's Eye. This disease makes its appearance on the leaves and stems as brown spots and on the fruits as pits or scabs with bright colored borders, which suggests the name of bird's eye.

Black Rot. This has been the worst disease of the grape the past year. In some instances the crop was reported as nearly all destroyed. The disease appears as brown spots on the leaves and as decayed spots on the grapes. The grapes finally become black and shriveled and covered with small black pimples. The "mummies" should be collected and burned, and the vines sprayed with one of the standard sprays several times during the season.

Downy Mildew. Yellow spots appear on the upper side of the leaves, and frosty patches beneath. The leaves may be gathered and burned when the disease is not very bad, or the vines can be sprayed with Bordeaux mixture. Specimens of the diseased leaves have been obtained from a number of places.

Powdery Mildew. This appears as a cottony growth on the leaves, spreading to the fruit. It can be kept in check by spraying. Dusting the vines with sulphur is practiced by some growers.

Ripe Rot. But a single case of ripe rot has come to my notice. In general appearance it resembles the bitter rot of the apple (which see). When the spores are inoculated into apples they bring about a rotting in a few days, indicating that the two diseases may be identical.

LETTUCE.

Downy Mildew. Specimens of seedling lettuce plants were received which had the downy mildew on them. It gives the leaves a frosted appearance. Too much heat and moisture are favorable for the development of the disease.

Drop or Rot. This is another serious disease of the lettuce when it once gets started, especially in the greenhouse, and is difficult to control. The older and injured leaves are attacked by a fungus that gradually extends to the main stem, causing the leaves and stem to rot. Several sets of plants that were being grown in the Experiment Station greenhouses for experimental purposes were destroyed by this disease. Great care must be taken in watering the plants so as not to injure the leaves. The house should be kept cool and well ventilated.

MUSKMELON.

Anthracnose. See under Watermelon.

Blight or Leaf Mold. This disease has been generally prevalent in the Ohio Valley and very destructive. The leaves are covered with yellowish brown spots at first, after which they begin to shrivel and finally die. Not only are the vines injured, but the fruit is of very inferior quality. The same fungus attacks the cucumber. When spraying is not practiced, muskmelons should not be grown on the same ground a second season. The fungus causing the disease may remain in the field from one season to the next.

OATS.

Smut. The smut of oats is too well known to need describing. The smut spores cling to the seed oats and are planted with them. Soaking the oats in a solution of copper sulphate or formalin will kill the smut spores.

PEACH.

Black Spot, or Scab. This disease has been seen almost everywhere, on the volunteer as well as on the cultivated peaches. Black spots appear on the fruit, sometimes covering the greater part of one side, causing the fruit to crack. Spraying with a weak solution of Bordeaux will tend to check the disease.

Brown Rot. See under Plum.

Leaf Curl. The young leaves when attacked by the leaf curl fungus, are lighter colored and considerable curled. There has been an abundance of the disease in some counties. The same treatment is recommended as for scab.

Yellows. Any indication of this disease is sufficient to warrant immediate destruction of the tree. It has been reported by a few growers. The cause of the disease is not definitely known. It may be recognized in part by the premature development of the winter buds into sickly branches, the premature ripening of the fruit and the general yellow colors of the leaves. The fruit is commonly streaked with red, especially on the inside.

PEAR.

Leaf Spot. This has been observed on a few trees. The leaves are spotted with small gray spots having a purple border.

Twig Blight. This has been very destructive in nearly all parts of the State. See under Apple.

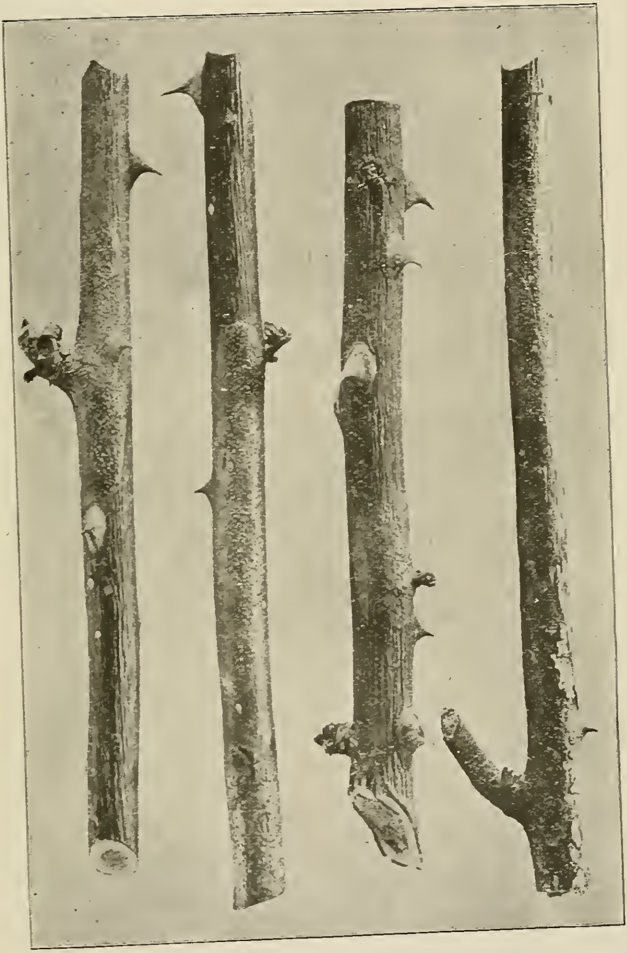
PLUM.

Black Knot. This disease occurs in nearly all parts of the State, being especially injurious to the Damson. The black knots that are to be found on the branches of the plum and cherry are too well known to require a description. Good results have been obtained by keeping the knots cut out.

Brown Rot. This disease has been very destructive to plums, peaches, and to some extent, cherries. A brown spot appears on the fruit, the entire fruit becoming infected within a short time. The fruit is later covered with a grayish mass of spores. The fruit may drop off or remain on the tree and serve as a means for infecting the other fruits. The branches are occasionally affected, especially those of the peach, so that the leaves and branches are killed. The dead branches and "mummies" should be removed. Spraying with some of the standard sprays at intervals until the fruit begins to ripen has proven to be fairly effective in controlling the spread of the rot.

POTATO.

Blight. A blight of the potato has been reported from a number of localities, but it has been impossible to get material for examination that was of any value, or to get any information concerning the general appearance of the disease other than that the vines died. A small black beetle was the cause of some of the blighting.



Cane Blight of Rose. Natural size. From photograph by W. E. Rumsey.

QUINCE.

Black Rot. See under Apple.

Twig Blight. See under Apple.

Leaf Blight. The leaves are covered with reddish-brown spots; they finally turn yellow and drop off. Brown spots also occur on the fruits. The same disease occurs on the pear. The fungus may be controlled to a large extent by spraying occasionally with Bordeaux.

RASPBERRY.

Rust. See under Blackberry.

Cane Blight. A blighting of the canes, which is causing considerable damage in New York State, has been collected at several places in this State. It was found first on the wild black raspberry and later on the cultivated raspberry and rose. A light colored spot is formed on the canes, the branches and leaves above the spot wilting and then dying. Specimens and information concerning its distribution and the amount of damage done to raspberries throughout the State are solicited by the Experiment Station.

ROSE.

Several diseases have been observed on the rose during the past summer, two of which are similar to the cane blight of the raspberry, but caused by different kinds of fungi. The investigation will be continued.

Leaf Blight. One of the most prevalent diseases of the rose is caused by a fungus that produces sooty spots on the leaves. The leaves turn yellow and fall off. There are some rose bushes near the Experiment Station that have no leaves left on them, except a very few on the ends of the branches. Where one has a few roses, the infected leaves can be removed before the fungus has matured and scattered its spores, but where there are a number, as in a rose garden, it will be necessary to use some kind of a spray.

Mildew. This is another common disease during the latter part of summer and autumn. The young leaves and stems are covered with a cottony growth of filaments, which causes the leaves to become curled. The leaves can be dusted with sulphur or a spray used.

SORGHUM.

Red Spot. This was abundant in one field. The lower leaves were covered with red spots in which there were small black specks, the fruit of the fungus.

STRAWBERRY.

Leaf Spot. White spots with a purple border occur on the leaves. When the disease is very bad the leaves may be cut and burned.

SWEET-PEA.

Anthracnose. Specimens of sweet-pea, having what seems to be an anthracnose which killed the stems at about the time the buds were ready to blossom, was sent to the Experiment Station from Bunker Hill. An attempt will be made to study the life-history of the fungus causing the disease, in connection with a similar disease of the clover.

TOMATO.

Leaf Spot. This disease has become very common. It reduces the size, yield and quality of the crop. Dark colored spots with white centers appear on the leaves, after which they die. Tomatoes should not be grown on the same ground where the disease was present the year before. A few sprayings with Bordeaux mixture is usually sufficient to check the disease, if the spraying is begun early enough.

End Rot. A rot that begins at the point or blossom end has been present to considerable extent in gardens and in one field of about an acre. Several fungi have been found in the rotted area, but it has not yet been determined which, if either, was the cause of the rotting. The disease has been worse where it was present the year before.

WATERMELON.

Anthracnose. This was probably the most important disease in 1904, both on account of the injury done to the growing plants, as well as on account of the poor quality of the watermelons. Black spots, which finally contain masses of pink spores are produced on the leaves, vines and watermelons. The leaves and vines are killed in the region of the spots. The anthraces, or ulcer-like cavities on the fruits, are very conspicuous. From personal observations made in the fields along the Ohio river, it was ascertained that the disease was worse in those fields where watermelons had been grown last year or the year before, or where there was a watermelon field a short distance away. The same disease was found on muskmelon and cucumber. Bordeaux mixture was used on an experimental plat by the Experiment Station with results that show that the quality of the melons was greatly improved on the sprayed strips, the vines continuing to grow and set fruit for about two months longer on the sprayed strips than they did on the unsprayed. By planting on ground where there had not been any melons or cucumbers grown for a few years, it is possible that the diseases if carried to the field would not develop to such an extent that it would materially injure the crop, or that spraying would be necessary. (See special report on diseases of melons and cucumbers).

Leaf Spot. Another important disease of the watermelon, and one that is commonly associated with the anthracnose, is a leaf spot. These spots are similar to those of the anthracnose, except that they are more nearly circular and have a gray center. The leaves are killed after a time, thus weakening the plant. The same treatment is recommended as for the anthracnose.

WHEAT.

Rust. This is a well known disease that is usually present to some extent in every wheat field. Some varieties of wheat have been found to be slightly more resistant than others.

Smut. There are two kinds of smut that are occasionally found on wheat, occasionally causing considerable loss. The loose smut destroys the head, while the closed smut develops inside the kernel. A small amount of loose smut was found in one field. For treatment, see under Oats.